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Sandia LabNews

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# Sandia delivers first DOE sounding rocket program since 1990s

## *HOT SHOT to validate missile technologies more quickly, carry scientific experiments*

***By Troy Rummler***

A new rocket program could help cut research and development time for new weapons systems from as many as 15 years to less than five.

Sandia developed the new program, called the High Operational Tempo Sounding Rocket Program, or HOT SHOT, and integrated it for its first launch earlier this year under NNSA direction.

The first HOT SHOT rocket launched from Sandia's Kauai Test Facility in Hawaii in May, marking the first time DOE/NNSA has used rockets carrying scientific instruments, also known as sounding rockets, since the 1990s. Sandia is planning four launches next year.

HOT SHOT launches comparatively inexpensive sounding rockets carrying scientific experiments and prototypes of missile technology. The flight data help researchers improve technologies, validate that they are ready for use and deploy them faster than with conventional validation techniques. In turn, NNSA is equipped to respond quickly to emerging national security needs. The program also supports a tailored and flexible approach to deterrence, as outlined in the 2018 Nuclear Posture Review.

The flights prove whether a prototype rocket and its components — from an onboard computer to a structural bracket — can function in the intense turbulence, heat and vibration a missile experiences in flight.

### Conventional vs. HOT SHOT

The Department of Defense also provides such confirmation with a conventional missile test following rigorous DOE studies and simulations on the ground. But by that point, the chance to significantly modify a component has largely passed. Until now, the DoD flight tests have been virtually the only way to get a clear picture of how new components fare in flight.

"It was a really difficult problem," Sandia mechanical engineer Greg Tipton said. "It's hard to imitate the same vibrations and forces a rocket experiences in flight on the ground."

Sandia's large-scale environmental testing facilities can mechanically shake objects back and forth and spin them at high speeds to mimic a flight experience. But like a 4-D amusement ride, these tests are imperfect analogs. For a stress-like vibration, HOT SHOT provides a much closer simulation. Other stresses, such as heat from re-entry or

*(Continued on page 2)*

LIFT OFF — The first HOT SHOT flight, shown here, launched from Sandia's Kauai Test Facility in Hawaii. (Photo by Mike Bejarano and Mark Olona)

# Majority rules when looking for earthquakes, explosions

## New Sandia software reduces false, missed detections of seismic activity

READING VIBRATIONS — Sandia researcher Tim Draelos inspects a sensor that looks for vibrations in the ground. He worked to develop new software that helps sensors better detect earthquakes and explosions and tune out routine activity. (Photo by Randy Montoya)

***By Kristen Meub***

A dormant volcano in Antarctica helped researchers at Sandia improve sensor data readings to better detect earthquakes and explosions and tune out everyday sounds such as traffic and footsteps.

Finding the ideal settings for each sensor in a network to detect vibrations in the ground, or seismic activity, can be a painstaking and manual process. Researchers at Sandia are working to change that by using software that automatically adjusts the seismic activity detection levels for each sensor.

Sandia tested the new software with seismic data from the Mt. Erebus volcano in Antarctica and achieved 18 percent fewer false detections and 11 percent fewer missed detections than the original performance of the sensors on Mt. Erebus.

Until now, the main way to ensure sensors were picking up unusual seismic activity and not reporting regular activity was to manually adjust the settings of each sensor to its specific surroundings. Unfortunately, getting those settings exactly right is difficult, especially because those ideal settings change with the seasons and weather patterns.

*(Continued on page 3)*

# Quantum research gets a boost at Sandia

## *Science community gets access to nascent nanoscience technologies*

**By Troy Rummler**

The Department of Energy has awarded Sandia and Los Alamos national laboratories $8 million for quantum research — the study of the fundamental physics of all matter — at the Center for Integrated Nanotechnologies.

The award will fund two three-year projects enabling scientists at the two labs to build advanced tools for nanotechnology research and development. Because of the collaborative nature of CINT, the award also will provide opportunities for researchers outside the labs to benefit from the new technologies.

"The science community has recognized that quantum-enabled systems are the new frontier for electronic and optical devices," said Sandia senior manager and CINT co-director Sean Hearne. "At CINT, we are developing extraordinary new techniques to place single atoms where we want them and control how they interact with the environment around them so that the unique quantum phenomena at the nanoscale can be harnessed."

At the atomic scale, matter follows rules of physics, called quantum mechanics, that can seem bizarre compared to a person's everyday experience, such as seemingly being in two places at once. However, budding technology is beginning to harness quantum mechanics to accomplish tasks impossible with conventional technology. Sandia and Harvard University, for example, previously collaborated to turn a single atom into an optical switch, the optical analog of a transistor, an essential component of all computer systems.

CINT, a DOE-funded nanoscience research facility operated by Sandia and Los Alamos, provides researchers from around the world access to expertise and instrumentation focused on the integration and understanding of nanoscale structures.

### Quantum-based analysis for all

Both of the newly funded CINT projects will enable researchers to create and study new materials that accentuate their quantum nature at the nanoscale.

Sandia physicist Michael Lilly is leading one of them to design and build the first quantum-based nuclear magnetic resonance instrument based at a U.S. shared user facility.

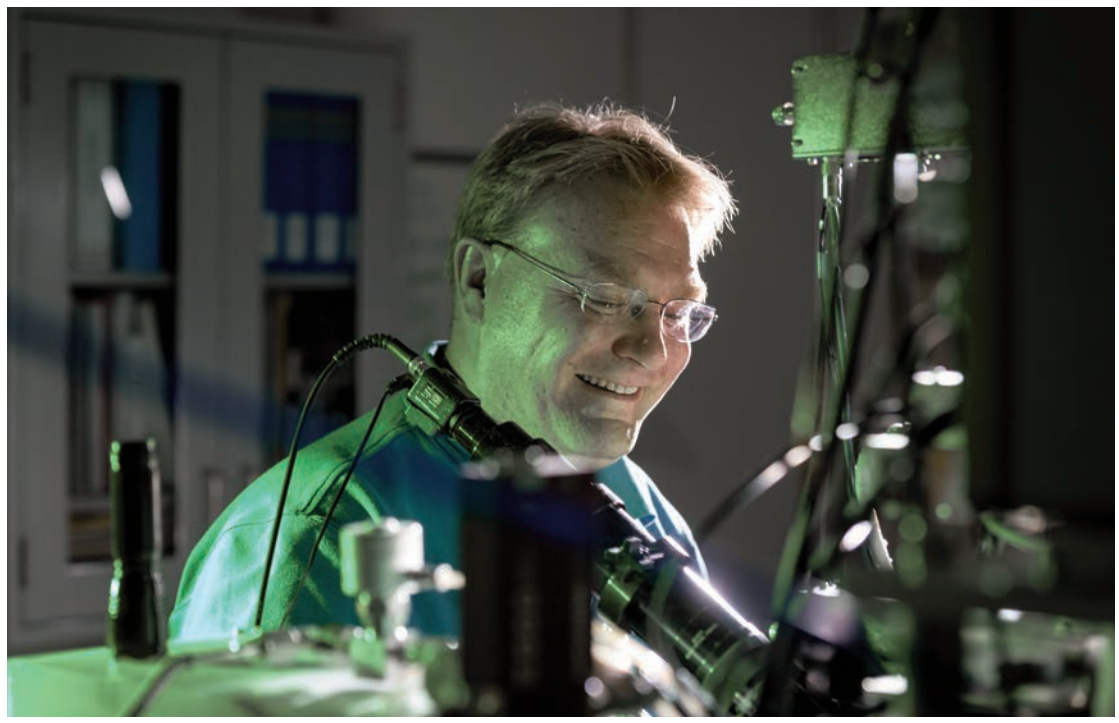
NMR is a mainstay technology in chemistry. It's often used to learn the molecular composition of a substance, and it's the same technology that makes MRIs work. But commercial NMR systems don't work on the very small samples that nanotechnology researchers generally produce.

"If you're studying individual properties of some nanomaterial, a lot of times it won't even be on your radar to do an NMR experiment, because it's just not possible," Michael said.

Using principles of quantum information science, collaborators will build an NMR instrument sensitive enough to work with extremely small volumes.

The instrument will actually be so sensitive that it will be able to read information from individual atoms. This single-atom resolution will be valuable to Michael and his collaborators because it reveals more information than the conventional technique, which only looks at groups of particles together. For example, researchers will be able to study whether single nanoparticles change properties as they grow or when they get close to other nanoparticles.

"NMR is a powerful technique," Michael said. "If we can extend it to the nanoscale, I think that will benefit a lot of CINT users."



QUANTUM TOOLBOX — Ed Bielejec examines a material at the Ion Beam Laboratory with the Nano-Implanter, a machine that produces very precise material defects. A smaller, lower voltage version will enable Ed and his team to do the same for advanced materials that could be used in semiconductors and other applications.

(Photo by Rebecca Gustaf)

### Engineering materials one atom at a time

Sandia also will enable nanoscience researchers to build new quantum devices by helping develop the first method to create what's called a defect center, or simply a defect, by design.

In this case, "defect" means a specific location in a material where an atom has been removed and, in some cases, substituted with a different element. Previous research has discovered that certain naturally occurring defects in materials have useful properties for quantum engineering.

However, "if you want to make a real device, you must be able to make these defects intentionally," said Han Htoon of Los Alamos. "You cannot rely on the defects that occur naturally."

Htoon is leading the second project and is collaborating with Sandia's Ed Bielejec. They will explore how to systematically introduce single-atom defects into advanced materials in a way that lets them control the number, location and properties of the substitutions.

Ed will lead an approach using Sandia's Ion Beam Laboratory, which uses ion and electron accelerators to study and modify materials and devices. He has successfully used such machines to precisely implant defects into a range of materials. However, quantum researchers want to use new materials, including some that are only a single layer of atoms thick. This means Ed and his team have to develop a method to fire a particle that can knock an atom out of place and then come to a dead stop and take the original particle's place.

"It's a complex task, but our incredible machines and our past success with external collaborators are what allow us to be confident that we can accomplish this," Ed said. "We're taking big steps forward, but we've already laid the paving stones ahead of us."

## *Lab News* Notes

**Editor's Note:** Lab News seeks guest columnists with observations on life at the Labs or on science and technology in the news and in contemporary life. If you have a column (500-750 words) or an idea to submit, please contact Jim Danneskiold, the acting editor.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# HOT SHOT program

*(Continued from page 1)*

the simultaneous combined environments experienced in flight, simply don't have accurate models or ground test methods researchers can use.

"HOT SHOT fills a hole between ground testing and missile testing," said Olga Spahn, manager of the department at Sandia responsible for payload integration for the program. "It gives researchers the flexibility to develop technology and see how it handles a flight environment at a relatively low cost."

The test data also will help engineers like Greg design more realistic ground tests, something industries from automobile to aerospace are also earnestly researching.

### Flexible test drives innovation

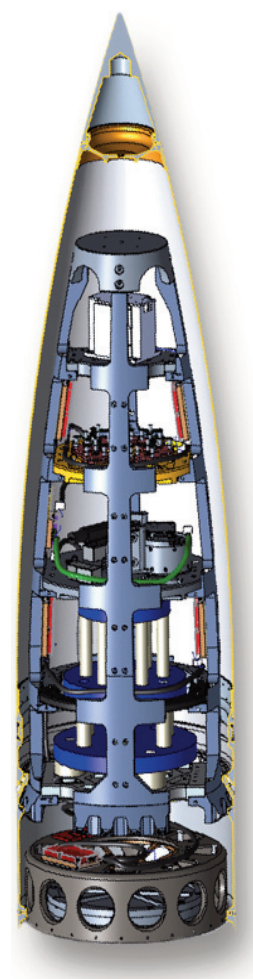
HOT SHOT will not replace final DoD flight tests. However, it does use comparatively simple, two-stage sounding rockets built from surplus inventory motors to recreate the flight environment of their more expensive cousins, which can cost tens of millions of dollars to fly.

The cost of a traditional flight test has made exploring some new ideas prohibitively expensive.

"By the time we're flying with DoD, the technology had better work. There's no room for failure," said Kate Helean, deputy director for technology maturation at Sandia.

Researchers from an NNSA facility or partner institution now can test their technology with HOT SHOT and risk much less if it fails. Sandia designed the program this way to encourage exploration and creativity, which further augment NNSA's ability to adapt weapons systems to urgent needs.

"We really want to be leaning into new and innovative ideas, and that means we have to tolerate failure early when the technology is being tested," Kate said.



MULTIPLE EXPERIMENTS — Multiple scientific payloads fly on each Sandia HOT SHOT flight, as illustrated here.

(Graphic by Sandia National Laboratories)

Inside each sounding rocket, dedicated research space is divided into decks, each with its own electrical and data ports to accommodate separate, even unrelated experiments.

Sandia plans to conduct multiple launches each year, so researchers from Sandia and other NNSA-affiliated institutions will have opportunities to test multiple versions of the same technology in relatively rapid succession. Internal instruments monitor the experiments and prototypes and send back real-time measurements to engineers on the ground.

"We provide the payload integration and ride; they provide the experiments for the payload," Olga said.

# Majority rules

(Continued from page 1)

During a three-year project funded by Laboratory Directed Research and Development, researchers developed software that automatically adjusts the detection settings for the data coming from each sensor in a network using a "majority rules" approach, which led to fewer false detections of seismic activity and fewer missed detections of actual events. The work was recently published in a Bulletin of the Seismological Society of America paper, "Dynamic Tuning of Seismic Signal Detector Trigger Levels for Local Networks," and the open source Python-based software is available for download.

## 'Polling the neighborhood'

The research team, led by Tim Draelos, a machine learning and signal processing researcher, developed an algorithm that reads the data from a neighborhood of sensors and compares the detections made by each sensor. If a majority of sensors in a similar location detects seismic activity at the same time, then the program marks the event as legitimate. If most of the sensors do not detect seismic activity, then the program doesn't mark the event and the detection levels for the sensors that falsely reported an event are adjusted.

"A neighborhood is a small subset of sensors in a network that all have a similar view of the world or a similar sensing footprint," Tim said. "They should agree on everything they see. If they don't, we're able to determine which sensor needs to be tuned so that we get better agreement in the future, which leads to better overall network detection quality. We don't ever want to miss an event like a nuclear explosion, for example."

This "majority rules" approach to seismic sensor data processing is automatic while the algorithm runs and allows continuous adjustments to the trigger levels that detect a seismic event, making readings from the sensors more accurate than readings from static sensors with fixed settings.

Tim and the team, including Hunter Knox, Matt Peterson and Chris Young, tested the algorithm using the Mt. Erebus seismic sensor network. They created a database of seismic events on the volcano by manually viewing all the sensor activity recorded over 24 hours and then marking seismic events. To be classified as an event, three or more sensors in the same neighborhood had to detect the seismic activity.

The team then ran the raw sensor data through the new majority rules algorithm to see how it performed and compared the results against the database of legitimate detections and the results of the sensors operating without the dynamic tuning of the algorithm.

The improvements in accurate detection rates are important because sensor networks generate a lot of data. For example, the International Data Center analyst-reviewed bulletin for 2014 only included 8 percent of the more than 5.5 million International Monitoring System seismic detections originally registered by sensors. This worldwide network helps verify compliance with the Comprehensive Nuclear Test Ban Treaty, which has been signed but not ratified by the United States, by detecting events that might show the treaty has been violated.

"A large portion, but not all, of the remaining 92 percent of detections were likely false positives, which leads to extraneous data storage and processing," Tim said. "Additionally, 39 percent of the detections included in the bulletin were found or modified by a human analyst, which indicates a large percentage of missed detections and wrongly measured detections by the sensors, which takes time and effort to amend."

Some dynamic signal detectors exist, but until now none have used sensor networks to optimize detections of seismic events. The new approach to tuning data could also be applied to environmental monitoring, motion sensor monitoring with cameras, chemical monitoring, infrasound monitoring and more.

"This is a general-purpose idea," Tim said. "It doesn't have to be seismic data. This algorithm can potentially be used anywhere you have a network or collection of sensors to detect events."

# Some like it cryogenic

## Sandia promoting safety of liquid hydrogen fuel stations

*By Jules Bernstein*

Sandia helped design the first generation of fueling stations for hydrogen-powered cars to be as safe as conventional gas stations. Now, a Sandia team is working to do the same for the next generation of hydrogen stations.

To keep up with growing demand for hydrogen fuel, retailers need to build many more fueling stations. This expansion requires switching from gaseous to liquid hydrogen because liquid is denser than gas, enabling retailers to store more of it in the same amount of space.

A new Cooperative Research and Development Agreement with Sandia will allow the largest hydrogen retailer in the U.S., First Element Fuel, to build many more of the cutting-edge liquid hydrogen stations. It will also help modernize the National Fire Protection Association safety codes for liquid hydrogen safety distances, which have not been updated in decades. The updated codes will in turn benefit hydrogen retailers and fire marshals in designing and permitting new, safer stations.

ASKING 'WHAT IF' — Sandia's hydrogen safety modeling team (left to right) include risk analyst Brian Ehrhart, project co-leader Chris LaFleur and co-leader Alice Muna.
(Photo by Lonnie Anderson)

Using Sandia-designed software, the Sandia research team is quantifying the effect of hydrogen leaks from various system designs, and the safety measures used to detect and protect against the effects of leaks.

"We can ask these 'what if' questions, such as 'how could a leak happen here?' and 'how can we mitigate the effects?' so that the leaks have less of a chance of causing problems," explained project co-leader Chris LaFleur. "This way, we can enable hydrogen fueling of fuel cell vehicles in places it's never been able to go before, like the busy downtowns of big, densely-packed cities."

## Growing demand for liquid hydrogen

Cars powered by hydrogen refill as quickly as those powered by gasoline and drive just as far. In addition, the only emission from their tailpipes is pure water, a factor in their growing popularity. A major obstacle to the growth of hydrogen-fueled transportation is lack of fueling stations.

"We need more stations and larger, faster, better equipment because we have more customers and more demand than we'd ever dreamed," said Tim Brown, chief operating officer of First Element Fuel, the largest U.S. retail hydrogen company. First Element operates 19 stations in California, each with only one pump and one hose. Stations operated by other retailers are similarly limited.

Even though there are only about 5,000 hydrogen fuel cell cars on the road today in the U.S. — Toyota Motor Corp., Honda Motor Company Ltd. and Hyundai Motor Company all sell them — the fuel supply is not enough to keep lines of drivers from accumulating at the stations, Brown said.

Once Mercedes-Benz and others bring their fuel cell models to market, fuel needs will only increase. First Element plans to open a dozen new hydrogen fuel stations in California in 2019 to meet the demand.

Currently, the U.S. retail hydrogen market is mainly in California due to government incentives for automakers to sell in the state, with the bulk of stations located in the San Francisco Bay, Los Angeles, and San Diego areas.

## Cryogenic challenge

The 'what if' safety questions are ones the team has previously answered for models of gaseous hydrogen leaks. However, liquid hydrogen carries its own set of unique benefits and challenges.

On the one hand, liquid hydrogen can be stored at significantly lower pressure than gas, which lowers the risk of a leak. However, liquid hydrogen is also cryogenic, meaning it must be kept very cold, roughly minus 423 degrees F.

"When released, liquid hydrogen can actually freeze the air around it," said Sandia risk analyst Brian Ehrhart. "This presents a challenge for calculating the concentration of hydrogen in the air."

The amount of hydrogen and oxygen in either the gas or liquid state is interdependent, since the more one liquifies, the more one warms and vice versa. The team negotiates this challenge by assuming an initial "zone" of hydrogen/air mixing that warms the mixture to a point at which Sandia's gas dispersion models can predict behavior.

This simplification allows the team to predict how far away from the leak the flammable concentration exists, rather than focusing on the mixture right next to the release and using more complex fluid dynamics models.

## Benefits abound

One result of this modeling process is that First Element Fuel will have rigorous, science-based evidence to help them obtain permits for the 12 stations they are planning to build.

"Sandia is the gold standard as far as the science goes," Brown said, "If Sandia's results show x, y and z, then I believe they're x, y and z. There's no second guessing. I know it's right, the fire marshal knows it's right and so does everyone else. Sandia brings the professionalism, rigor and accuracy I don't think I can get anywhere else."

SLEEK AND SAFE — Photo of a First Element Fuel liquid hydrogen retail fuel pump. The pump includes a canopy, and the fuel storage is pictured at the rear.

(Image courtesy of Black & Veatch)

Sandia also benefits from the project because it allows the team to demonstrate its safety models on real-life system designs. Furthermore, Sandia works directly with the National Fire Protection Association, which will use the data from the project to inform and update its liquid hydrogen safety codes.

The new code will allow future fueling stations to be evaluated from a performance-based standard, rather than a prescriptive one. Chris shared a cooking analogy to explain the difference between the two types of codes. "A prescriptive code is like a recipe that calls strictly for 3 cups of flour, 2 ounces of chocolate and 3 eggs to make a cake. A performance-based standard says, 'make a chocolate cake 3 inches high that tastes good,' and you get to decide how to go about that," she said.

The updated performance-based codes will make it easier for retailers in any part of the country to build safe stations, even if they can't meet certain precise code requirements. That in turn will encourage growth within the hydrogen vehicle industry.

"Our mission has always been to foster the adoption of these cars, ensuring better air quality and energy security," Brown said. "That is the part of the project that will live on beyond the particular stations we're building right now."

# Sandia **My Way**

## Open Enrollment 2019

# ACTIVE EMPLOYEE OPEN ENROLLMENT BEGINS NOVEMBER 1

Optimize Sandia's benefits to fit your life during this year's Open Enrollment for active employees beginning Nov. 1. Open Enrollment is your annual opportunity to review and update benefit elections including medical, dental, vision, and flexible spending accounts and change dependent enrollments. Your 2019 Open Enrollment selections must be made by 5 p.m. MT/4 p.m. PT Nov. 15.

To learn more, visit **hr.sandia.gov** or attend an Open Enrollment event. Questions to HR Customer Service, 505-844-4237.

At our Open Enrollment Events, active employees can learn about:

- New Paid Family Leave
- $25 Virtual Visits
- Vacation Buy
- 4/10 Schedules
- Critical Illness & Accident Insurance
- Much more!

Attend the event at your location for answers and expert advice from Sandia's benefits team and vendors.

**2019 OPEN ENROLLMENT EVENTS FOR ACTIVE EMPLOYEES**

| LOCATION | |
|---|---|
| **Sandia Labs (CA)**<br>Bldg. 904<br>Auditorium<br>7011 East Ave.<br>Livermore, CA | **Sandia Labs (NM)**<br>Bldg. 825,<br>Steve Schiff<br>Auditorium<br>Albuquerque, NM |
| **DATE** | |
| **Monday, Nov. 5** | **Wednesday, Nov. 7** |
| **FAIR TIME** | |
| **12:00 – 2:00 p.m.** | **9:00 a.m. – 2:00 p.m.** |
| **AUDIENCE** | |
| Employees and Spouses | Employees |

## Changes to 2019 Benefits

The changes listed below are effective Jan. 1, 2019. Find details about each plan and the Open Enrollment newsletter at **hr.sandia.gov**.

- Sandia Total Health plan premiums will increase between $2 and $67 per month depending on health plan and tier level.
- Dental and Vision Care premiums will increase by $1 or less per month.
- For employees hired before Jan. 1, 2007 and not yet retired before Jan. 1, 2019, retiree life insurance will no longer be employer-paid. Employees can instead elect the voluntary life benefit. Additional retiree life insurance options will be available through the retiree health administrator beginning Jan. 1, 2019.
- Virtual Visits for BCBSNM and UHC members will now have a $25 copay per visit, decreasing the employee cost of the benefit.
- OPEIU-represented employees may now purchase between eight and 80 hours of vacation.
- OPEIU-represented employees are now eligible for Sandia Extras.
- For OPEIU- and SPA-represented employees hired on or after Jan. 1, 2019, the Savings and Income Plan employer matching contribution will vest after the employee has three years of service. This does not affect current employees.
- The Tuition Assistance Program has increased tuition assistance maximums per calendar year as follows:
  - Regular exempt employees working 30 hours or more per week:
    - Undergraduate $4,000
    - Graduate $6,500
  - Regular non-exempt employees working 30 hours or more per week:
    - Undergraduate $4,000
    - Graduate $5,250 (When there is a business need and when the graduate-level coursework and academic area is relevant to the individual's current Sandia employment, a full-time non-exempt employee can request funding up to $6,500 [additional approval required]).
  - Regular exempt and non-exempt part-time employees working less than 30 hours per week:
    - Undergraduate $2,000
    - Graduate $3,250

## Voluntary Benefits

Open Enrollment is your chance to select the voluntary benefits most important to you, including Sandia Extras' Critical Illness, Accident Insurance, and Prepaid Legal Insurance, available only during Open Enrollment. These Sandia Extras voluntary benefits are open to non-represented and MTC- and OPEIU-represented employees, and may be obtained without providing health information, though benefit payments are not made for conditions that occurred prior to the coverage effective date.

Other voluntary benefits you can elect during Open Enrollment are:

- Vacation Buy
- Voluntary Life
- Long-term Disability Buy-Up
- 401(k) Automatic Increase and Rebalancing
- Flexible Spending Accounts for dependent care, healthcare, and transportation *(CA-only)*

For more information about the voluntary benefits available during Open Enrollment, visit **hr.sandia.gov** and read the Open Enrollment newsletter.

## Reminder

Employees may opt to receive a 2018 electronic 1095-C form by December 22, 2018, which provides proof of health insurance coverage, in HR Self-Service in lieu of a paper form. By Jan. 31, 2019, all employees should receive a 1095-C form, which should be kept as supplemental documentation for your 2018 taxes.

# Changes to time away from work benefits allow more flexibility for employees

The introduction of Paid Family Leave and the 4/10 work schedule demonstrate Sandia's commitment to providing flexibility for employees to manage their family responsibilities and foster a healthy work-life balance. These changes will be effective for non-represented employees on Jan. 1, 2019. Represented employees should reference their Collective Bargaining Agreements.

**Paid Family Leave** is a new resource for employees who need to care for a family member. Paid Family Leave will pay 70% of an employee's salary for up to six weeks to bond with a newborn, following placement of a child for adoption or foster care, or to care for a parent, spouse, son or daughter who has a serious health condition. Employees have the option to boost this 70% salary replacement by coupling Paid Family Leave with Vacation or Vacation Buy.

**Personal Absence** allows for up to 40 hours that employees can use for:

- Family care — caring for an ill family member or taking them to medical appointments during work hours
- A death in the immediate family or the funeral of a close relative
- Legally required paid time off, for example, school closures mandated for public safety reasons
- Voting
- Eligible government service time

**Sickness Absence**, which employees may use when unable to work due to illness or to attend medical appointments, will provide six weeks off at 100% of their salary, and an additional 20 weeks off at 70% of their salary. Using Paid Family Leave reduces the employee's available Sickness Absence on a one-to-one basis.

Employees may supplement their protection against unplanned time away from work situtations with voluntary benefits available during Open Enrollment:

- Purchase up up to 80 hours of Vacation Buy —unused Vacation Buy is sold back to employees at year's end for its original value.
- Long term disability buy-up and critical illness and accident insurance can also provide financial relief, depending on circumstances.

With the changes to Time Away From Work benefits, employees will have flexibility to mix Vacation and Vacation Buy with long-term Sickness Absence or Paid Family Leave to make more than 70% of their salary. For example, mixing two Vacation days with three Paid Family Leave days would yield 82% of an employee's usual salary for the week.

Employees who prioritize building up Time Away from Work benefits can schedule appointments on a 9/80 Friday off and exempt employees can shift their schedule to accommodate the appointment with manager consent, affording additional opportunities to meet personal obligations without using leave. Learn how to get the most out of Sandia's Time Away from Work benefits, including how they relate to other types of leave in California, at **mytimeaway.sandia.gov**.

To help employees achieve a work-life balance and meet the needs of a diverse and multi-generational workforce, Sandia is adding a **4/10 alternative work schedule** to the list of available work schedule options. Managers may approve alternate work schedules when they meet the needs of the business and adhere to Sandia's policies.

Available as an option in California on Oct. 26, 2018, the 4/10 schedule will become an option in New Mexico beginning Jan. 18, 2019. The 4/10 schedule will add the option for employees to work four days a week, 10-hours a day. The schedule will be an option, with management approval, for non-represented exempt and non-exempt employees, OPEIU-represented employees, as well as student interns. MTC- and SPA-represented employees should reference their Collective Bargaining Agreements.

As 2019 approaches, check **hr.sandia.gov** for additional information, including tools to assist employees and managers considering whether a 4/10 schedule is appropriate for their situation.

## CONCIERGE SERVICES

It's never been easier to make healthcare fit your lifestyle. From onsite services through Sandia Medical Clinic to $25 reduced copay virtual visits, receive care at work, home or on the go.

Need help finding a doctor or resolving a claim? Connect with Sandia's onsite advocates.

**Virtual visits** allow you to see and talk with a doctor from your smartphone, tablet, or computer— anytime and anywhere. Use virtual visits for a variety of conditions, including:

- Allergies
- Coughs
- Colds
- Ear infections
- Fevers
- Pink eye
- Rashes
- Seasonal flu
- Sinus problems
- Sore throats
- Urinary tract infections
- Behavioral health

The **onsite Sandia Medical Clinic** provides Sandia employees in New Mexico and California no cost acute or episodic care for a variety of illnesses and injuries. Walk in or call **505-844-4237** to schedule an appointment. Onsite customer advocates can help you better understand your health benefits and navigate the healthcare system. They can help you understand how a claim was paid, answer FSA & HRA questions, navigate appeals, find a doctor, and use the cost estimator tool. Call **505-284-8669** for Blue Cross Blue Shield of New Mexico (BCBSNM) or **505-844-0657** for United Healthcare (UHC).

**Need to find a primary care provider?** Connect with one of the following:

- (BCBSNM) Davita Medical Group Ambassador Line **505-262-7100**
- (BCBSNM) Lovelace Concierge Line **505-727-7100**
- (UHC) Presbyterian Customer Service Center **505-923-7300**

## RETIREE OPEN ENROLLMENT

### Changes for PreMedicare and Medicare Retirees

The changes listed below are effective Jan. 1, 2019:

**PreMedicare**

- There will be an increase to PreMedicare premiums and dental premiums.

**Medicare**

- There will be an increase to Your Spending Arrangement (YSA) allowance.
- There will be changes to premiums for the Sandia Sponsored Medicare Plans.
- Presbyterian Senior Care HMO-POS members will move to UnitedHealthcare Group Medicare Advantage (PPO) Plan.
- Humana members will receive a new identification card for 2019.
- There will be an increase to dental premiums.

Details about the Sandia retiree plans and Via Benefits can be found in the 2019 PreMedicare and Medicare Benefit Choices and Open Enrollment Guides, posted online at:

**PreMedicare and group plans:** sandiaretireebenefits.com

**Medicare:** My.ViaBenefits.com/Sandia

### OPEN ENROLLMENT DATES

| PREMEDICARE | MEDICARE |
|---|---|
| Monday, Oct. 15 – Friday, Nov. 16 | Monday, Oct. 15 – Friday, Dec. 7 |

### 2019 RETIREE BENEFIT FAIRS

| Tuesday, Oct. 30 | Monday, Nov. 5 | Thursday, Nov. 8 |
|---|---|---|
| PREMEDICARE<br>9:00 – 11:30 a.m.<br>*Presentation*<br>*10:00 – 11:00 a.m.* | 8:30 a.m. – 11:30 a.m. | PREMEDICARE<br>9:00 – 11:30 a.m.<br>*Presentation*<br>*10:00 – 11:00 a.m.* |
| MEDICARE<br>1:30 – 3:30 p.m.<br>*Presentation*<br>*2:00 – 3:00 p.m.* | PREMEDICARE<br>*Presentation*<br>*9:00 – 10:00 a.m.*<br>MEDICARE<br>*Presentation*<br>*10:00 – 11:00 a.m.* | MEDICARE<br>1:30 – 3:30 p.m.<br>*Presentation*<br>*2:00 – 3:00 p.m.* |
| **LOCATION** | | |
| **UNM Continuing Ed. Conference Center**<br>1634 University Blvd. NE<br>Albuquerque, NM | **Sandia Labs Bldg. 904 Auditorium**<br>7011 East Ave.<br>Livermore, CA | **UNM Continuing Ed. Conference Center**<br>1634 University Blvd. NE<br>Albuquerque, NM |

# Scientists, leaders take home five awards

(Continued from page 8)

## Working to curb unconscious bias in the workplace

Blythe, who also won a Women Worth Watching Career Achievement Award, said that long before she discovered materials science, her first loves were art and music. A native of Nashville, Tennessee, Blythe grew up playing piano, listening to her dad perform in bluegrass and country bands and attending poetry readings with her mom. She credits her grandfather, who immigrated to the U.S. from Mexico and studied engineering, with setting an example of embracing diversity of talents.

"He was an electrical engineer who ran his own practice, but he was also a watercolor artist and played piano," Blythe said. "Although he died before I was born, I always imagined that I got my mix of skills from him. Somehow knowing that he existed in my family lineage made me feel like I wasn't so weird."

Sandia manager **Blythe Clark** received a Women Worth Watching Career Achievement Award.

Blythe has a bachelor's in materials science and engineering from Northwestern University, and a doctorate from the University of Illinois Urbana-Champaign. She also worked as a postdoctoral fellow for two years at the Max Planck Institute for Metals Research in Stuttgart, Germany, before taking a research position at Sandia.

As a manager, Blythe said she strives to cultivate diversity and inclusion within her team and throughout the labs. She is co-chair of the Sandia Women's Action Network, a group chartered to enrich and support the careers of all women at Sandia, and focused on having a measurable impact in mitigating unconscious and implicit gender bias.

Prior to becoming a manager overseeing work in materials characterization and forensics, Blythe led multiple research teams focused on nanomechanical behavior of metals, thermal stability of nanocrystalline alloys and the application of fundamental physical insights toward predictive simulation development. She holds multiple patents and has given dozens of invited presentations on her work.


## Recent Retirees

W. Graham Yelton 38

Bruce Berry 28

## Mileposts

*New Mexico photos by Michelle Fleming*
*California photos by Randy Wong*

Randy Schmitt 35

Doug Ammerman 30

Fred Helsel 30

Rafael Aragon 25

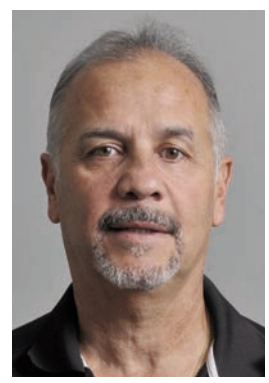
Bob Crocker 25

Johnny Montano 20

Jonathan Rath 20

Kelley Allen 15

Brett Clark 15



Leroy Duran 15

Todd Embree 15

Matthias Geissel 15

Valerie Gonzales 15

Craig Jorgensen 15

Cristina Martinez 15

Brian Owens 20

Gracie Raney 15

Nathaniel Roehrig 15

Bobby Smith 15

Kevin Smart 15

Erik Spoerke 15

Joshua Usher 15

# SANDIA CLASSIFIED ADS

**Note: The Classified Ad deadline for the Nov. 23 issue of the Lab News will be Thursday, Nov. 15 at noon instead of Friday, Nov. 16. This deadline change applies to this issue only.**

## MISCELLANEOUS

PLUSHED STUFFED TURKEY, Gund, 8-1/2"T x 8"W, great for Thanksgiving, like new, $15; bike spoke reflectors, 36, 360 degree reflection; $6. Wagner, 505-504-8783.

DINING TABLE, 47-in. w/4 chairs, solid oak, butterfly insert, round, excellent condition, located in the East Mountains, $475. Willmas, 505-907-9324.

DR TOW-BEHIND TILLER, 3-ft. wide, behind ATV or riding mower, tractor, electric start, $1,000. Valdez, 228-1569, ask for Vern.

PICKUP TRUCK MOTORCYCLE LIFT, requires 8-ft. bed, see at youtube.com/watch?v=Rom7shfFqDI, $1,300. Potter, 505-610-9933.

SCANDINAVIAN FESTIVAL, Nov. 3, 10 a.m.-4 p.m., Immanuel Presbyterian church, 114 Carlisle SE, folk art, dancing, food, free. Richard-Franco, 294-5739.

MITER SAW, Kobalt, 7-1/4", sliding single bevel, gently used, excellent condition, $129 new, asking $60. North, 505-514-7878.

ELLIPTICAL, Weslo, $60; JE3212LED 32-in. TV, 12-V, still-in-box, $275; Guest 10-amp 2-output charger, $60; oversize 6-lb. fill sleeping bag, $40. Kercheval, 505-266-5833.

CAMPER SHELL, for compact truck, was on Chevy S10, 60" x 75", $150. Simmons, 259-7833.

DENVER BRONCOS TICKETS, 4, vs. Steelers, Nov. 25, Mile High Stadium, sec. 100, row 17, $275 ea. Kibler, 505-453-0940.

ACOUSTIC GUITAR, Martin DSR, w/custom case, new, sacrifice sale, 50% below original price. Reid, 505-916-0900.

WINTER TIRES, set of 4, Michelin X-ICE XI3, 225/60 R17, used 2 seasons, $150 OBO/all. Ehrhart, 505-917-4830.

FURNITURE: large couch; wood executive desk; Haworth task chair; large bookshelf; crystal stemware; more, photos available. Aldridge, 506-0301.

ASBURY CHRISTMAS BAZAAR, 10000 Candelaria NE, Nov. 3, 9 a.m.-3 p.m., >65 crafters. Sparling, 281-7267.

CLASSIC JAZZ CDS, various, Benny Goodman, Al Hirt, Artie Shaw, Billie Holiday, etc. free. Colgan, 344-3776.

CHRISTMAS DISHES, Farberware Holiday Snowman, service 8 w/serving pcs., washer/microwave/oven safe, perfect condition, $90. Murphy, 892-0288.

COMBO FIRE/SECURITY SAFE, Sentry S3150, heavy-duty, 16"W x 17"D x 18"H, 2 adjustable shelves, $75. Mills, 505-450-9767.

CHINA CABINET, early 1900's, curved glass, mahogany, I've had since 1975, excellent condition, $1,400. Sichler, 505-565-5885.

PRESSURE OVEN, Wolfgang Puck, like new, call for photos, cost >$200, asking $90. Barton, 505-604-2249.

GARAGE SALE, Sat. Oct. 27, 8 a.m.-noon, furniture, foosball table, home décor from Parade of Homes, etc. 10650 Palomas, 87122. Fulcher, 463-6585.

## TRANSPORTATION

'16 DODGE LARAMIE 1500, crew cab, 4x4, $36,000. Reyes, 505-480-3609.

'13 RAV4 LIMITED, AWD, new battery, premium JBL sound, Bluetooth phone/audio, 46K miles, great condition. Clem, 505-379-0475.

'05 CORVETTE, blue, loaded, always garaged, records available, 64K miles, can be seen on Craigslist #6708302494, $21,000. Cocain, 505-550-8484.

'97 MERCURY SABLE LS, new brakes, rotors, tires, no AC, good heat, 145K miles, $1,000 OBO. Fredericks, 505-864-3248.

## REAL ESTATE

3-BDR. HOME, 3 baths, 1,746-sq. ft., lovely Mesa del Sol home, great community pool, parks & more, call for showing, $250,000. Gonzales, 505-450-8508, kyrygo@gmail.com, ask for Kyle.

4-BDR. HOME, 3 baths, 3-car garage, 2,734-sq. ft., pool, spa, 3 fireplaces, 8908 Vallejo Place NE, $444,000. Schell, 505-681-5267, ask for Cheryl.

4-BDR. HOME, 2-1/2 baths, 2,427-sq. ft., 3109 Matador Dr. NE, complete remodel, new roof scheduled, mountain/city views, $339,000. Levinson, 505-977-3373.

## WANTED

VOLUNTEERS, to help Fabulous Felines w/kittens, http://fabulousfelines.org. Stubblefield, 263-3468, fabulousfelines@comcast.net.

HANDYMAN, experienced, credibly referenced, for next few weeks or months in small condo, 87111. Greene, 505-508-0094.

## How to submit a classified ad

**DEADLINE:** Friday noon before the week of publication unless changed by holiday.

Submit by one of these methods:

- EMAIL: Michelle Fleming (classads@sandia.gov)
- FAX: 505-844-0645
- MAIL: MS 1468 (Dept. 3651)
- INTERNAL WEB: Click on the News tab at the top of the Techweb homepage. At the bottom of the NewsCenter page, click the "Submit a Classified Ad" button and complete the form. Questions to Michelle Fleming at 505-844-4902.

Due to space constraints, ads will be printed on a first-come, first-served basis.

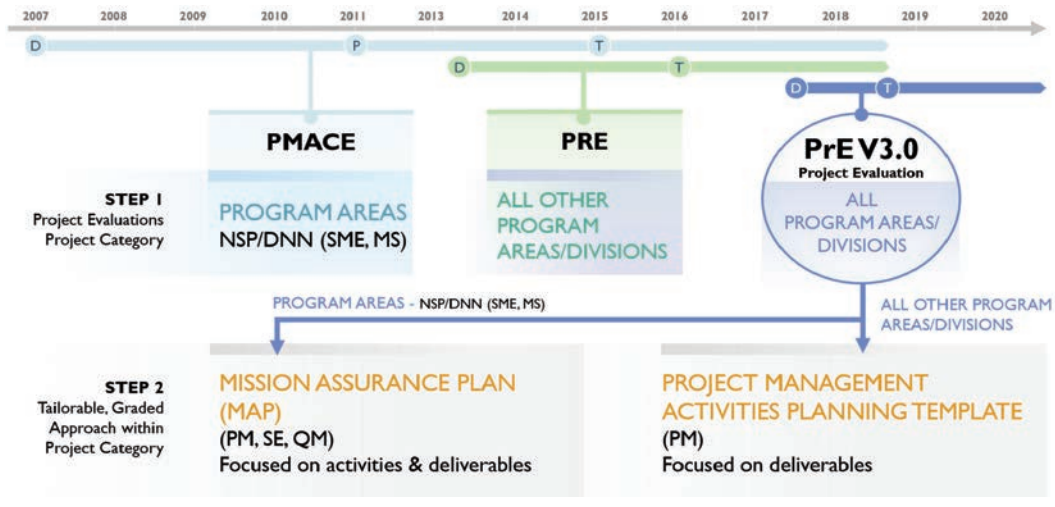
## Ad rules

1. Limit 18 words, including last name and home phone (web or email address counts as two or three words, depending on length).
2. Include organization and full name with ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. The same ad may not be run more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees only.
10. Housing listed for sale is available without regard to race, creed, color, gender, sexual orientation or national origin.
11. Work wanted ads are limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in poor taste.



# Evaluating project risks and needs

***By Janeen Miller***




At the start of a project, it is important for a project lead to work with their team to identify possible risks or complications that may derail the project. Comprehensive evaluation of a project at its inception helps to avoid or mitigate potential pitfalls and to determine the level of rigor and governance required for project execution.

Project leads at Sandia used to use one of two options for project evaluation. The first, for Division 5000 mission delivery projects, was the Project Mission Assurance Category Evaluation (PMACE) tool. The second, the Project Rigor Evaluation (PRE) tool, was used by all other divisions for mission delivery and mission support projects.

"Both of these tools were effective, but Sandia wasn't consistent in the application of principles across the Labs," said senior manager Marlo Maxson. "When NTESS leadership reviewed our project management policies in 2017, they promoted the idea of one corporate solution for project evaluation and included it in one of their Top Five initiatives."

### Introducing PrE V3.0

Sandia has introduced a software tool called Project Evaluation (PrE V.30), which integrates the PMACE and PRE tools and is the first step in setting Labs-wide standards for project execution. Developed by the quality assurance and program planning organizations, PrE V3.0 guides mission delivery and mission support project teams in discussions about risks and needs, and runs that information through a risk-informed algorithm to categorize project risk level, thus determining the appropriate project category.

"PrE V3.0 incorporates the best parts of the PMACE and PRE tools, and features new capabilities requested by our users," Marlo said. "We kept the user-friendly PRE interface and added the PMACE review reminders, revision and administrative capabilities, project and task number coordination and expanded role assignments. The small number of projects needing to enter classified data will also be able use PrE V3.0."

All PMACE and PRE evaluations were migrated to the new PrE V3.0 in October, and Sandia now requires all projects to use the tool.

### Consistent application of tools

As part of the effort to standardize project execution, Marlo said PrE V3.0 is Sandia's first step in the consistent and appropriate application of Mission Assurance Engineering System (MAES) principles, which identify requirements for project management, systems engineering and quality management. Skilled subject matter experts work with project teams to establish plans that ensure project activities and deliverables are considered, negotiated, communicated, planned and budgeted throughout project lifecycle.

Robert Hennessey of stockpile management believes that early application of MAES principles played a critical role in the success of a key, five-year program he managed for a DoD customer.

"The MAES framework and the PMACE tool benefitted the project throughout its various lifecycles, helping to establish rigor level and set clear expectations for risk, configuration management and work planning and control for activity-level work," he said. "Now PrE V3.0 will provide that same thorough assurance platform for projects across the Labs, not just in mission delivery."

### Next steps

The teams that developed PrE V3.0 plan to improve its content and increase the understanding and use of MAES principles in projects across Sandia.

"We want to provide consistent MAES approaches, tools and expertise that meet the needs of our science and engineering programs and projects and their customers," Marlo said. "And, ultimately, run efficient, effective projects that provide consistently outstanding products. With PrE V3.0, we are one step closer to our goal."

Hands-on training on the PrE V3.0 tool is available. The schedule and registration are available online at prev3.sandia.gov. Questions to Kathy Lane or Sue McIntosh.

# Scientists, leaders take home five awards honoring their work

*By Manette Newbold Fisher*

*Photos by Lonnie Anderson*

Five Sandia female employees with significant accomplishments in science, engineering, management or diversity and inclusion were among the winners of two prestigious career achievement and leadership awards.

Three of the awards were presented to Sandia's Chief Information Officer Carol Jones, chemical engineer Rekha Rao and electrical engineer Ireena Erteza at the annual Women of Color STEM Conference earlier this month.

Two Women Worth Watching awards, recognizing leading women in business, honored Employee Health Services Director Renee Holland and manager Blythe Clark of materials science.

## Director's tech vision has ripple effect beyond Sandia

Carol, who is also director of information technology services, leads the Labs' information technology and information management strategies. She received a Women of Color STEM Outstanding Achievement Award as a Technology All-Star.

"Technology is always moving forward, and as it changes, Sandia continues to move forward and adapt to ensure we are meeting national security needs," Carol said. "Changes in technology present new challenges and opportunities, and I work with amazing people who help solve unique problems, and guarantee Sandia is always on the cutting edge of technology."

Director **Carol Jones** received a Women of Color STEM Outstanding Achievement Award as a Technology All-Star.

Carol's professional career spans more than 31 years at Sandia and IBM, and includes many leadership roles. She currently manages approximately 1,000 people.

Her work has had a broad impact not only at Sandia, but across the DOE/NNSA. She led development of DOE's cyber strategy, authoring a 2015 paper — in consultation with CIOs at all the national laboratories and plants — that describes a proactive, complex-wide approach. Former DOE Deputy Secretary Elizabeth Sherwood-Randall published Carol's paper as an agency-wide cyber plan.

Carol also serves as chair of the National Security Enterprise CIO Council which coordinates implementation of cybersecurity and information management requirements from the DOE and NNSA.

"Carol's achievements and managerial leadership set a powerful example for anyone wishing to pursue a career in IT or other STEM fields. She has earned the respect and admiration of those who work for and with her, and continues to be a strong role model and mentor for many other women and minorities at Sandia and in the IT industry," said Scott Aeilts, associate labs director, Mission Services.

A New Mexico native, Carol holds a bachelor's in business administration and a master's in management information systems from the University of New Mexico.

## 'A rare combination of ability, imagination, determination'

With 28 years of experience in developing computational models for complex fluids at Sandia, Rekha received a peer-reviewed Women of Color Career Achievement Award. This award was chosen by panel of leaders from industry, government and academia.

"I am so appreciative of my management for nominating me for the award, and am shocked that I won given the amazing women who were nominated," she said.

Rekha is one of the founding developers of Goma, a multiphysics, open source software code developed for manufacturing, and a 2014 R&D 100 Award winner.

"We've been working on Goma for more than 25 years and it's been a rare honor to work with the same people on such an impactful project," Rekha said, adding that Goma work continues with funding from the DOE and 3M to design systems that use passive radiant cooling instead of electricity.

She also has been working on foam models to understand how polyurethanes fail. Her work on foam process models has had an impact at both Sandia and the Kansas City National Security Campus, resulting in process improvements, higher yields in foam parts and shorter turnaround times for structural foam mold designs. Her effort recently led to a DOE-funded project with Dow Chemical Co.

"Rekha is one of the foremost experts in the world in the mechanics of complex fluids," said Sandia manager Sophia Lefantzi. "She has a rare combination of ability, imagination and determination that enables her to make unique technical contributions, ensure Sandia's mission success, and train future generations of talented researchers."

Chemical engineer **Rekha Rao** received a Women of Color Career Achievement Award.

A daughter of an engineer, Rekha followed in her father's footsteps.

"I always loved math and science," she said, and she enjoys sharing that love with kids, graduate students and early career staff. "In computational mechanics, you create a whole world on the computer. That's just been really fun and amazing for me."

Originally from California, Rekha holds bachelor's and doctorate degrees in chemical engineering from the University of California, Berkeley, and the University of Washington.

## Winner loves science, mentoring and the arts

For 25 years, Ireena has contributed to research into radiation effects on optical processing systems, novel optical devices and signal processing and system development for unattended ground sensors and synthetic aperture radar (SAR). She received a Women of Color STEM Outstanding Achievement Award as a Technology All-Star.

One of Ireena's greatest impacts has been in SAR. When she first joined the SAR algorithms group, she examined the methods used to address the computationally challenging problem of SAR image formation, then applied her signal processing and high performance computing expertise. Rather than using optical wavelengths like the human visual system, SAR uses microwave wavelengths to create images, especially valuable for images at night or during inclement weather.

Electrical engineer **Ireena Erteza** received a Women of Color STEM Outstanding Achievement Award as a Technology All-Star.

For more than 35 years, Ireena has mentored high school and college students and members of the workforce, where she is part of the recruiting and student intern programs.

Ireena earned a bachelor's in electrical engineering from the University of New Mexico, and subsequently earned a master's and doctorate in electrical engineering from Stanford University.

In 2017, Ireena received a national Asian American Engineer of the Year Award, and has a Distinguished Alumni Award from the UNM School of Engineering. This year, the Stanford School of Engineering asked her to participate in their #IAmAnEngineer campaign, showing the diversity of engineering and how engineers have a beneficial impact on people and society.

"Engineering doesn't mean you're a stereotypical nerd, isolated in a room with a computer," she said. "Engineering is people-oriented. We work on teams, and communication is very important. In engineering we use math, science and engineering skills to make and build things, and we use it to solve important problems to help people and society. People who aren't engineers don't realize that there is a strong creative aspect to our work. Creativity and imagination are two of the most important parts of being an engineer."

## 'I always knew health was important'

Renee started her career at Sandia in 1995, was a founding member of Sandia's Disease Management Clinic and has served in a variety of leadership positions. She received a Women Worth Watching Career Achievement Award.

Sandia Employee Health Services director **Renee Holland** received a Women Worth Watching Career Achievement Award.

Renee leads a multi-disciplinary team of healthcare providers who provide onsite medical, health and wellness services at Sandia's clinic in New Mexico.

Renee, a registered nurse, earned a bachelor's in health promotion from Minnesota State University, and a master's in community health education from the University of New Mexico.

"I always knew health was important and I knew I wanted to work with that message," Renee said.

Over the last five years, Renee helped establish more than 20 energy hubs throughout Sandia's New Mexico and California campuses. The indoor and outdoor energy hubs provide stretching and exercise equipment for the workforce to take breaks throughout the day. Enclosed indoor energy hubs around the labs offer meditation spaces and clean, safe rooms for nursing moms, Renee said. Energy hub spaces are now included in every new building plan.

While the energy hubs can be used by anyone at the labs, they help promote diversity by giving people spaces where they can nurse, perform deep breathing, visualization or stress reduction exercises and collect their thoughts, Renee added.

"My passion during the past 20 years included creating a culture of health, inclusive of women in the workplace, in a predominantly male working environment," she said.

*(Continued on page 6)*

## Navy Week visit

NAVY WEEK — Rear Adm. Mark E. Bipes, deputy commander, Navy Medicine West, and deputy director of the Navy Medical Service Corps, talks with Josh del Villar during a visit to Sandia's medical facilities during Albuquerque's Navy Week. The annual observed Navy Week gives area residents opportunities to learn about the Navy, its people and its importance to national security.

(Photo by Lonnie Anderson)